

# Modeling the economic effects of a time-based ticket system of public traffic

## Executive summary

Now the passengers in Szeged have to punch their paper tickets. We investigated the customs of traveling inhabitants of uniform sociologic and income sectors of Szeged. We applied microsimulation to be able to determine the effects of the introduction of new time-based tickets on the profitability of the public transportation, on the satisfaction of inhabitants, and on the total traveled distance.

## Challenge overview

Every town have a known complex networks of public transportation by bus, tram, and other kinds of vehicles. There are common vertices of the directed network systems. Sometimes we have to change vehicles to reach our destination. The time-based tickets allow us to interchange between means of transports. What is the optimal time-price structure of tickets? How can we attract more persons in public transport? How can we help with a specific time-based ticket system in order to reduce the number of cars in the city?

## Implementation of the initiative

Our project with Szeged Transport Company Ltd. was affected also by Tisza Volán Zrt. with joint passenger measures of the bus network of Szeged. The project participants composed the suitable models, simulations and implement the respective computer algorithms.



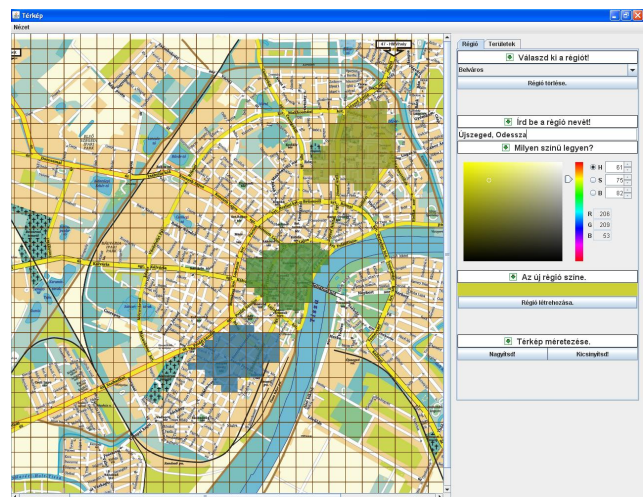
Network of public traffic in Szeged

## The problem

Beside the complex network system, the frequently visited places – the so-called main destinations – play a key role in our model. The similar income regions can be seen in the map. The shaping of these regions follow the local specialities such as housing estates which were built at the same time; the green belts; downtown; students' hostels; etc. The size, the density of population and the suspected willingness of people who live there to use public transport is related to the income region. In some regions the fine structure of population causes a few problems. For example many people live in blocks of flats compared to the green belts. We completed an investigation based on satellite pictures which helped us a lot to obtain the data for the survey. In the distribution of the departures from a particular stop we counted not only the density of population but also inhabitants from the nearby regions. That is why the more detailed division inside regions proved to be useful. We have also fitted our model to earlier traffic counting data.

## Results and achievements

Our customer obtained an answer based on the computer simulation of our model about what kind of time-based ticket system is the best in order to increase the number and the satisfaction of passengers.



## Lessons learned and replicability

The valid model of Szeged can be applied to bigger cities, too. The more given data the more detailed answer the customer can get on the economic efficiency of the time-based ticket system.

## Contacts, references

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